UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OR 97232-1274

Refer to NMFS No.:
WCRO-2021-00710

November 8, 2021

Laura Boerner
Chief, Planning, Environmental and Cultural Resources Branch
U.S. Army Corps of Engineers, Seattle District
P.O. Box 3755
Seattle, Washington 98124

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Skagit Diking District 3 and 12 Levees Rehabilitation of Flood Control Works, Skagit County, Washington

Dear Ms. Boerner:

Thank you for your letter of March 30, 2021, requesting initiation of formal consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the PL84-99 repair of two sections of levee in Skagit County, Washington. We initiated formal consultation on April 30, 2021.

The enclosed document contains a biological opinion prepared by NMFS pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the levee repair project in the Skagit River in the vicinity of the Cities of Burlington and Mount Vernon. In this Opinion, the NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of Puget Sound Chinook salmon, Puget Sound steelhead, or result in the destruction or adverse modification of designated critical habitat for these species. This document also documents our conclusion that the proposed action is not likely to adversely affect Southern Resident killer whales (SRKW) and their designated critical habitat.

As required by section 7 of the Endangered Species Act, the National Marine Fisheries Service provided an incidental take statement with the biological opinion. The incidental take statement describes reasonable and prudent measures the National Marine Fisheries Service considers necessary or appropriate to minimize incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions. Incidental take from actions that meet the term and condition will be exempt from the Endangered Species Act take prohibition.

Per your request, NMFS also reviewed the likely effects of the proposed action on essential fish habitat (EFH), pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)), and concluded that the action would adversely affect the EFH of Coho, Chinook, and Pink salmon. Therefore, we have included the results of that review in Section 3 of this document. Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to the National Marine Fisheries Service within 30 days after receiving these recommendations.

If the response is inconsistent with the Essential Fish Habitat conservation recommendation, the U.S. Army Corps of Engineers must explain why the recommendations will not be followed, including the justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall Essential Fish Habitat program effectiveness by the Office of Management and Budget, the National Marine Fisheries Service established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each Essential Fish Habitat consultation and how many are adopted by the action agency. Therefore, in your statutory reply to the Essential Fish Habitat portion of this consultation, we ask that you clearly identify the number of conservation recommendations accepted.

Please contact Janet Curran, consulting biologist at the Oregon Washington Coastal Office (janet.curran@noaa.gov), if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Kim Kratz, Ph.D
Assistant Regional Administrator
Oregon Washington Coastal Office

cc: Amanda Ogden, USACE
Fred Goetz, USACE

bcc: OWC – PDF (Read File)
OWCO/NPS – PDF (Curran)
OWCO/NPS – PDF (Babcock)
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ECO #: WCRO-2021-00426

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Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the

Skagit Diking District 3 and 12 Levees Rehabilitation of Flood Control Works
Skagit County, Washington

NMFS Consultation Number: WCRO-2021-00710

Action Agency: U.S. Army Corps of Engineers, Seattle District

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Puget Sound steelhead (*Oncorhynchus mykiss*)	Threatened	Yes	No	Yes	No
Puget Sound Chinook (*O. tshawytscha*)	Threatened	Yes	No	Yes	No
Southern Resident killer whale (*Orcinas orca*)	Endangered	No	No	No	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon (Puget Sound Chinook, Coho, and pink salmon)	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service
West Coast Region

Issued By:

Assistant Regional Administrator
Oregon Washington Coastal Office

Date: November 8, 2021

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1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the NOAA Library Institutional Repository [https://repository.library.noaa.gov/welcome]. A complete record of this consultation is on file at West Coast Region office, in Lacey, Washington.

1.2 Consultation History

On March 30, 2021, NMFS received a letter and Biological Assessment (BA) from the U.S. Army Corps of Engineers (USACE) requesting formal consultation pursuant to section 7(a)(2) of the ESA for the repair of Skagit River levees at two locations (Skagit Diking District (DD) 3 and 12) in vicinity of the cities of Burlington and Mount Vernon in Skagit County, Washington (USACE 2021). The NMFS initiated formal consultation on April 30, 2021.

Public Law 84-99 (33 U.S.C. Section 701n) authorizes the USACE to repair the flood-damaged sections of DD 3 and DD 12 levees. The USACE repair work under this authority is limited to the repair of flood control works damaged or destroyed by floods. The statute authorizes rehabilitation to the level of protection exhibited by the flood control work prior to the damaging event. The local sponsors for this project are Skagit DD 3 and DD 12.

The purpose of the project is to repair the DD 3 and DD 12 levees to a 50-year level of flood protection. A February 2020 flood event damaged the DD 3 levee along 60 linear feet (LF). The DD 12 levee required emergency repairs during the February flood event along 300 LF. After floodwaters receded an additional 200 LF of damage were identified. Notification via e-mail of the flood event and general explanation of proposed repairs were provided to the NMFS on January 30 and 31, 2020. The NMFS was notified of work ending on February 2, 2020, and provided a summary of the repair work conducted on February 14, 2020. In light of the interval of time necessary to assess, design, coordinate, and plan for a repair to be conducted during an appropriate in-water work window period, as further described in the BA, the USACE requested consultation in advance of conducting the final repairs to the levees.

Repairs will restore flood protection to the same level provided by the levees prior to the February damaging flood event. The USACE plans to repair both levees in-place with a total repair length of 150 LF at DD 3 and 700 LF at DD 12. In-water work will occur between June 15 and August 31.

The action area is within the geographic range of species listed as threatened or endangered under the ESA. The USACE determined that the proposed project "is likely to adversely affect" Puget Sound (PS) Chinook salmon (*Oncorhynchus tshawytscha*), PS steelhead (*Oncorhynchus mykiss*), and their designated critical habitats (USACE 2020). NMFS conducted formal consultation on PS Chinook salmon, PS steelhead, and the critical habitats of these species. The USACE concluded that their action "is not likely to adversely affect" Southern Resident killer whale (SRKW) (*Orcinus orca*) and designated critical habitat. Section 2.12 documents our conclusion that the proposed action is not likely to adversely affect SRKW and their designated critical habitat. No conference is required for this action concerning the September 19, 2019, proposed rulemaking by the NMFS to revise designated critical habitat for SRKW on the outer coast of Washington (84 FR 49214), because the proposed additional critical habitat is located well outside of the action area.

Finally, the proposed action will adversely affect Essential Fish Habitat (EFH) for Chinook salmon, coho salmon (*O. kisutch*), and pink salmon (*O. gorbuscha*). A complete record of this consultation is on file electronically at West Coast Region office in Lacey, Washington.

1.3 Proposed Federal Action

Under the ESA, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02), and under the MSA, Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).

The proposed work is described in detail in the USACE's BA (USACE 2021).

Project History

The Skagit County DD 3 Main levee is located on the left bank of the Skagit River near Mount Vernon, Washington. It is roughly 43,800 feet long and is the upstream portion of a 3-segment system. In its undamaged state, the levee provides a 50-year level of protection (LOP) to the City of Mount Vernon and surrounding agricultural areas. The Skagit County DD 12 levee is located on the right bank of the Skagit River near the town of Burlington, in Skagit County, Washington. It is approximately 6.4 miles long and is the upstream segment of a 3-segment system that protects urban, residential, commercial, agricultural, and public lands. In its undamaged state, it provides a 50-year level of protection to the City of Burlington and surrounding areas.

Since 1975, the levees have been repaired a number of times including both the riverward and landward levee slopes. The most recent USACE repair to DD 3 was in 2011 and to DD 12 was in 2015. The 2011 Skagit levee repair consultation resulted in a biological opinion (NMFS) (Ref. 2011/00333). The 2015 Skagit levee repair consultation resulted in a concurrence letter from NMFS (Ref. WCR-2015-2958).

Flooding Incident, 2020 Emergency Work, and Present Status of the Levees

The following description of the flooding event and emergency repairs is taken from the BA for the project (USACE 2021). According to the BA, the first week of February 2020 brought an atmospheric river event into the Pacific Northwest. The event combined copious amounts of rain to Washington, warmer temperatures, and higher snow levels. Combining the heavy rainfall with rapid snowmelt caused flooding across Washington, with some places exceeding record values. While the Skagit River was spared the more extreme flooding, but a smaller, discrete event occurred. The Skagit River exceeded flood stage in early February 2020. Significant precipitation resulted in sustained river levels above Phase 1 flood stage for 1 day (February 1 into February 2). Phase 1 floods as defined by Skagit County, inundate low areas near the Skagit River, may cover a few small sections of roads, and occur every few years on the average. These floods generally do not cause significant damage in the Skagit River Valley (Skagit County 2021). Based on flow analysis at the US Geological Service (USGS) gage on the Skagit River near Mount Vernon (USGS 12200500), this was approximately a 40 percent annual chance exceedance (ACE) event (2.5-year return period).

At DD 3, a slope failure occurred near Station 429+00 along approximately 60 linear feet (LF) of the levee due to a combination of riprap being scoured from the riverward toe and the saturated conditions of the embankment material. The failure created a near-vertical head scarp roughly 15 feet tall. This failure threatens the sheet pile cutoff and the approximately 3.5-foot tall floodwall constructed along the landward edge of the levee crest. In the damaged state, the level of protection is diminished from two percent (50-year) to 100 percent (1-year) ACE.

At DD 12, the District noted cracking in the bench between the levee and the river during the February flood event. This bench and the associated riprap armoring is critical to the levee performance and has been evaluated by the USACE as an appurtenant levee component in previous levee inspections. The District began construction of an access road to reach the damaged section, using quarry spalls and geofabric. The USACE took over the flood fight response and constructed emergency bank stabilization over approximately 300 LF of the bench, between roughly Stations 300+00 and 303+00. During the flood fight, riprap was placed within the footprint of the existing levee. The bench has a revetment that extends to the river bottom. To reduce the threat of rotational failure, the flood team removed material from the upper third of the revetment slope and replaced it with flood fight material. The flood fight material does not encroach beyond the pre-existing revetment. The river is deep along this bank and the flood fight material does not extend past the upper third of the slope. The riprap replaces material lost during the flood and does not extend into the river. The flood fight material was placed to create a smooth transition to the existing slope as well as upstream and downstream tie-ins. After floodwaters receded, the District observed additional cracking in the silt bench extending approximately 200 feet on either side of the repair. This cracking indicated that the riverward slope of the bench is unstable and continues to slide into the river. In all, the damaged area is approximately located between Stations 298+00 and 305+00. In the damaged state, the level of protection is diminished from two percent (50-year) to 100 percent (1-year) ACE.

The Skagit County DD 3 and DD 12 levees were constructed by local interests in the late 1800's and protect homes, businesses, agricultural crops, public roads, and utilities. The purpose of the project is to restore the 50-year level of flood protection to protect lives and property from subsequent flooding. The February 2020 work on the DD 12 levee provided temporary supplemental protection to prevent levee failure. However, additional damage was observed after floodwaters receded and the levee prism remains compromised. In their damaged condition, both levees are providing a 1-year flood (100 percent ACE) level of protection. If the levees were to fail, there would be an increased risk to life safety, property, and public infrastructure particularly due to the location of the levees and their physical proximity to urban development, public roads, and agricultural crops (USACE 2021).

Project Area and Action Area

The project area occurs in the Skagit River Basin in the northern portion of Puget Sound. The repair projects are located within diking districts on the Skagit River near the Cities of Mount Vernon and Burlington, in Skagit County, Washington. The project area is defined in this opinion as the work area and river within one mile upstream and one downstream of the work zones at the DD 3 and DD 12 repair sites. The action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area is extended into the Puget Sound for prey effects to SRKW from the project's effects to PS Chinook salmon. The action area for this levee repair includes the reaches of the lower Skagit River, from Sedro Woolley into Puget Sound, Strait of Georgia, and Strait of Juan de Fuca. This action area includes the area of influence due to project disturbances in turbidity, edge habitat vegetation and nutrient inputs, and the influence on any migratory populations that use the river and the estuary that could be important prey species SRKW in the estuary and in the greater Puget Sound and Salish Sea.

The USACE conducted temporary emergency repairs to the DD 12 levee between February 1 and 2, 2020, to supplement local efforts during the 2020 flood. The temporary measures executed in February 2020 involved work from the top of the bench, placing material by bucket load in a controlled manner to provide a blanket of armor to reduce the impacts from the high-velocity flows and high-water levels. The emergency repairs involved placing riprap along approximately 300 LF of the riverward bench. Willows spaced on approximately 5-foot centers were also removed as part of the emergency repair. The riprap that was placed reduced erosion from the high river velocities and reduced the risk of levee failure from cracking and slope instability. The USACE determined that flood fight emergency response efforts were necessary to prevent catastrophic levee failure.

The USACE did not conduct turbidity monitoring during the flood fight due to the extremely high background turbidity at the time and the safety concerns associated with attempting such monitoring. It was not feasible to install a coffer dam isolating the river from the levee during the flood. The high water and floating debris created dangerous conditions precluding installation of a coffer dam.

The following best management practices (BMPs) were in place under these emergency response circumstances:

- Clean quarry stones, without excessive sediments, were utilized for the repair.
- Riprap was placed via bucket load onto the riverward levee face. Riprap was not end dumped all at once.
- Prior to work, equipment was checked for hydraulic fluid leaks and during construction, equipment was monitored for leaks.
- Equipment worked from top of levee. Only the excavator bucket worked in the water.
- Spill kit was on site during flood response work.
- Equipment fueling took place away from the river.
- Repair was completed in 2 days (short duration).

The temporary emergency action reduced the imminent threat of levee failure, but the levee prism remains in a damaged state and scour protection along the toe was not addressed by the flood fighting action due to the high-water level. During the flood, it was not feasible or prudent to fully restore scour protection due to the high water levels, and even with the addition of armor rock, part of the levee prism remains in a compromised state. If the levee were to fail, a number of structures (commercial and residential) could be flooded and public infrastructure could be damaged (USACE 2021).

Proposed Levee Repairs

<u>Dike District 3</u>

The USACE proposes to restore the levee to its pre-damaged level of protection. Any sloughed material would be removed from the slope. The downstream extent of the repair would incorporate a buried toe with 4 feet of Class V riprap embedded into the foundation. The damaged riverward slope would be re-armored with a 2.5-foot thick blanket of Class III riprap placed over a 12-inch layer of quarry spalls. The upstream and downstream ends would be smoothly transitioned into the existing slopes. All repairs would occur within the pre-damage footprint as confirmed by historical records of the most recent prior repair to this site. Total rehabilitation construction length is 150 LF, which includes any necessary transitions. Topsoil and native hydroseed would be placed in all areas indicated on the plans to restore the project to the existing condition prior to construction. A slope setback is impractical at this location because of a road and businesses that are directly adjacent to the levee.

<u>Dike District 12</u>

The USACE proposes to replace the 2 to 1 vertical slope with a reduced (laid back) 3 to 1 sloped levee. Material placed during the flood fight would be incorporated into the permanent repair. Any sloughed material would be removed from the slope. The downstream extent of the repair would incorporate a launchable toe using 4 feet of Class V riprap. The damaged riverward slope would be re-armored with a 4-foot thick blanket of Class V riprap placed over a 12-inch layer of quarry spalls which is an increase in size from the existing Class IV riprap. The upstream and downstream ends would be smoothly transitioned into the existing slopes. All repairs would occur within the pre-damage footprint. Total rehabilitation construction length is 700 LF, which includes any necessary transitions. Topsoil and native hydroseed would be placed in all areas indicated on the plans to restore the project to the existing condition prior to construction.

Equipment to be utilized would be similar to those employed during previous rehabilitation projects include: hydraulic excavator, dump truck, and bulldozer. Construction is expected to occur during the June 15 – August 31 work window established by the Washington Department of Fish and Wildlife (WDFW) when juvenile salmonids are least likely to be in the area. Construction vehicles would access the site by existing levee access ramps and the levee crown, which are accessible from public rights-of-way at several locations throughout the length of the project. Excavated materials would be staged within the levee footprint and at designated staging areas. Repairs to DD 3 and DD 12 would occur concurrently and are expected to take approximately six weeks.

Environmental Mitigation (Offsetting) Measures

USACE is proposing environmental measures to mitigate or offset some of the lost habitat function of the riverine edge habitat to the extent possible within the constraints of the levee system, land ownership, and adjacent land use.

<u>Habitat Capacity Mitigation Tool</u>

For the 2011 Skagit River Levee Rehabilitation Project, USACE formed a Technical Working Group to develop a strategy for assessing the impacts of the levee repairs and developing measures to partially offset those impacts. The Technical Working Group includes representatives from the DDs, NMFS, USFWS, the Skagit River System Cooperative, and USACE. Through multiple meetings and discussions as well as site visits, USACE staff created a tool, the Habitat Capacity Mitigation Tool (HCMT), which was then further developed by the Technical Working Group. The HCMT is described in greater detail in Appendix C of the USACE's BA (USACE 2021).

The parameters for HCMT development were to assess impacts of levee repairs, provide options that could be combined to provide the greatest on-site compensation for impacts, and evaluate off-site mitigation options. The tool relies heavily on published scientific data of current fish populations and fish usage of different riverbank habitat types to determine potential mitigation options such as slope laybacks, large woody debris, and vegetation plantings. The result is an assessment tool that focuses on habitat capacity degradation due to levee repairs.

To provide compensatory mitigation for detrimental effects of levee repair on edge habitat, many mitigation offset options were considered that can be applied in various combinations to achieve the greatest on-site reduction of effects, and evaluate off-site mitigation options. A typical levee repair excavates the bank to a 2H:1V slope, places a one-foot spall blanket and then a three-foot riprap blanket. The mitigation offset options deviate from that typical levee repair to create edge habitat improvements compatible with a leveed riverbank. Based on the results from HCMT, the USACE determined that the proposed mitigation for this action is consistent within the HCMT framework to mitigate edge habitat impacts including the February 2020 emergency repair at DD 12. For these proposed 2020 repairs, the mitigation offset options include:

- Two rows of willows will be planted, the first starting at ordinary high water with willows spaced every 12-inches along the full repair at both levees and the second will start approximately 3 feet above the first lift.
- Placement of topsoil and native hydroseed along upper slope along the full repair at both levees.
- A slope layback to create a 3H:1V slope along 700 LF at the DD 12 repair site.
- Placement of 7 anchored rootwads at a location downstream of the DD 3 repair site at river mile (RM) 10. Rootwads will be anchored using boulders and placed via excavator from the bank.

Best Management Practices

Below are Best Management Practices (BMPs) that the USACE will incorporate into the proposed action. Some are integrated into the repair, while others pertain to operation and care of equipment.

- A pre-construction meeting should be conducted to look at existing conditions and any possible fine-tuning that should be done for BMPs or environmental requirements. The pre-construction meetings will include outside resources agencies like USFWS or NMFS.
- Refueling will occur on the backside of the levee.
- At least one fuel spill kit with absorbent pads will be onsite at all times.
- All work done in the water is scheduled to occur during the in-water work window (June 15 to August 31).
- At least one USACE biologist and geotechnical engineer will be available via phone during construction. USACE biologists may visit the construction site and provide periodic updates to the Services on construction including an onsite visit with staff. USACE biologists may schedule a visit to construction sites with the Services. The geotechnical engineer may also visit the construction site. All visits will be coordinated with the Project Manager, and Construction Manager.
- Vegetation removal will be limited to the repair sites.
- Noxious weeds will be disposed of separately from other organic materials at an approved off-site location.
- All construction materials will be free of contaminants such as oils and excessive sediment.
- Equipment used near the water will be cleaned prior to construction.
- Construction equipment shall be regularly checked for drips or leaks. Any leak will be fixed promptly or the equipment will be removed from the project site.
- Drive trains of equipment will not operate in moving water, and work will occur from the top of the bank. Only the excavator bucket with thumb attachment will extend into the water.

- Rock placement will occur only within the project footprint.
- Rocks will be individually placed. No end dumping of rocks will occur.
- Remove all trash and unauthorized fill in the project and staging area, including concrete blocks or pieces, bricks, asphalt, metal, treated wood, glass, floating debris, and paper, that is waterward of the ordinary high water line and dispose of properly after work is completed.

In addition, a Fueling and Spill Recovery Plan will be developed prior to construction that will include specific BMPs to prevent any spills and to prepare and react quickly should and incident occur. A Water Quality Monitoring Plan will also be developed to define the turbidity monitoring that will occur during construction. Monitoring will be conducted to ensure that State Water Quality Standards are met. Water quality sampling protocols are detailed in Appendix D of the BA. Should construction efforts exceed the state turbidity standards, or a visible turbidity plume is observed, work will be halted and construction methods adjusted to ensure that further exceedances will not occur.

The action area means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area for this levee repair includes the reaches of the lower Skagit River, from Sedro Woolley into Puget Sound, Strait of Georgia, and Strait of Juan de Fuca. This action area includes the area of influence due to project disturbances in turbidity, edge habitat vegetation and nutrient inputs, and the influence on any migratory populations that use the river and the estuary that could be important prey species for SRKWs in the estuary and in the greater Puget Sound and Salish Sea.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50

CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of “destruction or adverse modification,” which “means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species” (50 CFR 402.02).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a “destruction or adverse modification” analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The 2019 regulations define effects of the action using the term “consequences” (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44977), that definition does not change the scope of our analysis and in this opinion, we use the terms “effects” and “consequences” interchangeably.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Evaluate the range-wide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their habitat using an exposure-response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species, or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2 Range-wide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species’ likelihood of both survival and recovery. The species status section also helps to inform the description of the species’ “reproduction, numbers, or distribution” as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the function of the essential PBFs that help to form that conservation value.

One factor affecting the status of ESA-listed species considered in this opinion, and aquatic habitat at large, is climate change. Climate change is likely to play an increasingly important role in determining the abundance and distribution of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. The largest hydrologic responses are expected to occur in basins with significant snow accumulation, where warming decreases snow pack, increases winter flows, and advances the timing of spring melt (Mote et al. 2014, Mote 2016). Rain-dominated watersheds and those with significant contributions from groundwater may be less sensitive to predicted changes in climate (Tague et al. 2013, Mote et al. 2014).

During the last century, average regional air temperatures in the Pacific Northwest increased by 1-1.4°F as an annual average, and up to 2°F in some seasons (based on average linear increase per decade; Abatzoglou et al. 2014; Kunkel et al. 2013). Warming is likely to continue during the next century as average temperatures are projected to increase another 3 to 10°F, with the largest increases predicted to occur in the summer (Mote et al. 2014). Decreases in summer precipitation of as much as 30 percent by the end of the century are consistently predicted across climate models (Mote et al. 2014). Precipitation is more likely to occur during October through March, less during summer months, and more winter precipitation will be rain than snow (ISAB 2007; Mote et al. 2013; Mote et al. 2014). Earlier snowmelt will cause lower stream flows in late spring, summer, and fall, and water temperatures will be warmer (ISAB 2007; Mote et al. 2014). Models consistently predict increases in the frequency of severe winter precipitation events (i.e., 20-year and 50-year events), in the western United States (Dominguez et al. 2012). The largest increases in winter flood frequency and magnitude are predicted in mixed rain-snow watersheds (Mote et al. 2014).

Overall, about one-third of the current cold-water salmonid habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (Mantua et al. 2009). Higher temperatures will reduce the quality of available salmonid habitat for most freshwater life stages (ISAB 2007). Reduced flows will make it more difficult for migrating fish to pass physical and thermal obstructions, limiting their access to available habitat (Mantua et al. 2010; Isaak et al. 2012). Temperature increases shift timing of key life cycle events for salmonids and species forming the base of their aquatic foodwebs (Crozier et al. 2011; Tillmann and Siemann 2011; Winder and Schindler 2004). Higher stream temperatures will also cause decreases in dissolved oxygen and may also cause earlier onset of stratification and reduced mixing between layers in lakes and reservoirs, which can also result in reduced oxygen (Meyer et al. 1999; Winder and Schindler 2004, Raymondi et al. 2013). Higher temperatures are likely to cause several species to become more susceptible to parasites, disease, and higher predation rates (Crozier et al. 2008; Wainwright and Weitkamp 2013; Raymondi et al. 2013).

As more basins become rain-dominated and prone to more severe winter storms, higher winter stream flows may increase the risk that winter or spring floods in sensitive watersheds will damage spawning redds and wash away incubating eggs (Goode et al. 2013). Earlier peak stream flows will also alter migration timing for salmon smolts, and may flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and reducing smolt survival (McMahon and Hartman 1989; Lawson et al. 2004).

In addition to changes in freshwater conditions, predicted changes for coastal waters in the Pacific Northwest as a result of climate change include increasing surface water temperature, increasing but highly variable acidity, and increasing storm frequency and magnitude (Mote et al. 2014). Elevated ocean temperatures already documented for the Pacific Northwest are highly likely to continue during the next century, with sea surface temperature projected to increase by 1.0-3.7°C by the end of the century (IPCC 2014). Habitat loss, shifts in species' ranges and abundances, and altered marine food webs could have substantial consequences to anadromous, coastal, and marine species in the Pacific Northwest (Tillmann and Siemann 2011, Reeder et al. 2013).

Moreover, as atmospheric carbon emissions increase, increasing levels of carbon are absorbed by the oceans, changing the pH of the water. Acidification also impacts sensitive estuary habitats, where organic matter and nutrient inputs further reduce pH and produce conditions more corrosive than those in offshore waters (Feely et al. 2012, Sunda and Cai 2012).

Global sea levels are expected to continue rising throughout this century, reaching likely predicted increases of 10-32 inches by 2081-2100 (IPCC 2014). These changes will likely result in increased erosion and more frequent and severe coastal flooding, and shifts in the composition of nearshore habitats (Tillmann and Siemann 2011, Reeder et al. 2013). Estuarine-dependent salmonids such as chum and Chinook salmon are predicted to be impacted by significant reductions in rearing habitat in some Pacific Northwest coastal areas (Glick et al. 2007).

Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances, and therefore these species are predicted to fare poorly in warming ocean conditions (Scheuerell and Williams 2005; Zabel et al. 2006). This is supported by the recent observation that anomalously warm sea surface temperatures off the coast of Washington from 2013 to 2016 resulted in poor coho and Chinook salmon body condition for juveniles caught in those waters (NWFSC 2015). Changes to estuarine and coastal conditions, as well as the timing of seasonal shifts in these habitats, have the potential to impact a wide range of listed aquatic species (Tillmann and Siemann 2011, Reeder et al. 2013).

The adaptive ability of these threatened and endangered species is depressed due to reductions in population size, habitat quantity and diversity, and loss of behavioral and genetic variation. Without these natural sources of resilience, systematic changes in local and regional climatic conditions due to anthropogenic global climate change will likely reduce long-term viability and sustainability of populations in many of these ESUs (NWFSC 2015). New stressors generated by climate change, or existing stressors with effects that have been amplified by climate change, may also have synergistic impacts on species and ecosystems (Doney et al. 2012). These conditions will likely intensify the climate change stressors inhibiting recovery of ESA-listed species in the future.

2.2.1 Status of the Species

Table 1, below provides a summary of listing and recovery plan information, status summaries and limiting factors for the species addressed in this opinion. More information can be found in recovery plans and status reviews for these species. Acronyms appearing in the table include DPS (Distinct Population Segment), ESU (Evolutionarily Significant Unit), ICTRT (Interior Columbia Technical Recovery Team), MPG (Multiple Population Grouping), NWFSC (Northwest Fisheries Science Center), TRT (Technical Recovery Team), and VSP (Viable Salmonid Population).

Table 1. Listing classification and date, recovery plan reference, most recent status review, status summary, and limiting factors for each species considered in this opinion.

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Puget Sound Chinook salmon	Threatened 6/28/05 (70 FR 37159)	Shared Strategy for Puget Sound 2007 NMFS 2006	NWFSC 2015	This ESU comprises 22 populations distributed over five geographic areas. Most populations within the ESU have declined in abundance over the past 7 to 10 years, with widespread negative trends in natural-origin spawner abundance, and hatchery-origin spawners present in high fractions in most populations outside of the Skagit watershed. Escapement levels for all populations remain well below the TRT planning ranges for recovery, and most populations are consistently below the spawner-recruit levels identified by the TRT as consistent with recovery.	• Degraded floodplain and in-river channel structure • Degraded estuarine conditions and loss of estuarine habitat • Degraded riparian areas and loss of in-river large woody debris • Excessive fine-grained sediment in spawning gravel • Degraded water quality and temperature • Degraded nearshore conditions • Impaired passage for migrating fish • Severely altered flow regime
Puget Sound steelhead	Threatened 5/11/07	NMFS 2019	NWFSC 2015	This DPS comprises 32 populations. The DPS is currently at very low viability, with most of the 32 populations and all three population groups at low viability. Information considered during the most recent status review indicates that the biological risks faced by the Puget Sound Steelhead DPS have not substantively changed since the listing in 2007, or since the 2011 status review. Furthermore, the Puget Sound Steelhead TRT recently concluded that the DPS was at very low viability, as were all three of its constituent MPGs, and many of its 32 populations. In the near term, the outlook for environmental conditions affecting Puget Sound steelhead is not optimistic. While harvest and hatchery production of steelhead in Puget Sound are currently at low levels and are not likely to increase substantially in the foreseeable future, some recent environmental trends not favorable to Puget Sound steelhead survival and production are expected to continue.	• Continued destruction and modification of habitat • Widespread declines in adult abundance despite significant reductions in harvest • Threats to diversity posed by use of two hatchery steelhead stocks • Declining diversity in the DPS, including the uncertain but weak status of summer-run fish • A reduction in spatial structure • Reduced habitat quality • Urbanization • Dikes, hardening of banks with riprap, and channelization

2.2.1 Status of the Critical Habitat

This section describes the status of designated critical habitat affected by the proposed action by examining the condition and trends of the essential physical and biological features of that habitat throughout the designated areas. These features are essential to the conservation of the ESA-listed species because they support one or more of the species' life stages (e.g., sites with conditions that support spawning, rearing, migration and foraging).

For most salmon and steelhead, NMFS's critical habitat analytical review teams (CHARTs) ranked watersheds within designated critical habitat at the scale of the fifth-field hydrologic unit code (HUC5) in terms of the conservation value they provide to each ESA-listed species that they support (NMFS 2005). The conservation rankings were high, medium, or low. To determine the conservation value of each watershed to species viability, the CHARTs evaluated the quantity and quality of habitat features, the relationship of the area compared to other areas within the species' range, and the significance to the species of the population occupying that area. Even if a location had poor habitat quality, it could be ranked with a high conservation value if it were essential due to factors such as limited availability, a unique contribution of the population it served, or is serving another important role.

A summary of the status of critical habitats, considered in this opinion, is provided in Table 2, below.

Table 2. Critical habitat, designation date, federal register citation, and status summary for critical habitat considered in this opinion

Species	Designation Date and Federal Register Citation	Critical Habitat Status Summary
Puget Sound Chinook salmon	9/02/05 70 FR 52630	Critical habitat for Puget Sound Chinook salmon includes 1,683 miles of streams, 41 square mile of lakes, and 2,182 miles of nearshore marine habitat in Puget Sounds. The Puget Sound Chinook salmon ESU has 61 freshwater and 19 marine areas within its range. Of the freshwater watersheds, 41 are rated high conservation value, 12 low conservation value, and eight received a medium rating. Of the marine areas, all 19 are ranked with high conservation value.
Puget Sound steelhead	2/24/16 81 FR 9252	Critical habitat for Puget Sound steelhead includes 2,031 stream miles. Nearshore and offshore marine waters were not designated for this species. There are 66 watersheds within the range of this DPS. Nine watersheds received a low conservation value rating, 16 received a medium rating, and 41 received a high rating to the DPS.

Status of the Species and Habitat in the Action Area

The Skagit River, located in northern Puget Sound, drains westward from the Cascade Mountains. The river basin encompasses over 3,100 square miles of watershed area. The project area is located in western Skagit County, near the confluence of the Skagit River and Puget Sound. The topography of the Skagit Basin varies greatly due to its mountainous origins. Elevations range from sea level to over 3,000 feet at its headwaters. Elevation at the project site is near sea level. Precipitation is highly variable across the basin. The mainstem Skagit River within the DD 12 damaged location is where the river takes an almost 90-degree bend just upstream of the reach and the upstream portion of the levee. This short reach has a history of damage with the most recent Federal repair completed in 2015 just upstream of the damaged location. The mainstem Skagit River within the DD 3 damaged location is located on the downstream side of an outside bend.

Total runoff from the basin averages approximately 12 million acre/feet per year (USGS 2018). The annual runoff pattern has two peaks, one occurring in November through January and the second in June. The peaks are driven by a combination of high rainfall or snowmelt and reservoir management operations. The Skagit River flows are regulated by Ross Dam and two smaller dams (Gorge Dam and Diablo Dam) near the town of Newhalem and by Baker Dam on the Baker River, which is a major tributary to the Skagit River. Other major tributaries to the Skagit River include the Sauk and Suiattle Rivers.

The mainstem Skagit River within the project area is a large low-gradient channel ranging from 500 to 600 feet wide. The river is predominantly a run or glide throughout this area, with few sand-gravel bars. About 2.5 miles downstream of Mount Vernon, the river splits around Fir Island into the North and South Forks. Both forks further divide into smaller sloughs before flowing into Puget Sound.

The Skagit River through the project reach provides migratory and rearing habitat for all of the salmon species that use the Skagit River, as well as habitat for a diversity of other aquatic and terrestrial species. Salmonid species in the project area include Chinook, pink, chum, steelhead, coho, sockeye, bull trout, rainbow trout, cutthroat trout, and kokanee (WDFW 2018a). The Skagit River, with its 2,900 tributaries, is the only river system outside of Canada and Alaska that supports all five species of Pacific salmon (WDOE 2016). While most Puget Sound river populations remain far below their recovery planning targets, the Skagit populations some are doing better. For instance, the recent 5-year abundance geomean for Suiattle River spring Chinook salmon is at 103 percent of its low productivity planning target for abundance. Upper Sauk River spring Chinook salmon and Upper Skagit River summer Chinook salmon are at 43 percent and 37 percent, respectively, of their low productivity planning targets.

The WDFW Priority and Habitats and Species List database (2018a) defines six stocks of Chinook that can be found within the project reach: 1) Upper Sauk (run: Spring, status: depressed), 2) Suiattle (run: Spring, status: healthy), 3) Cascade (run: Spring, status: depressed), 4) Upper Skagit (run: Summer, status: depressed), 5) Lower Skagit (run: Fall, status: depressed), and 6) Lower Sauk (run: Summer, status: depressed). Summer-run Chinook salmon are supplemented by hatchery releases upstream of the action area. The Skagit River has four life history strategies for wild Chinook. There are three ocean-type strategies: 1) Fry migrants, which migrate quickly to Skagit Bay after emergence, 2) Delta rearing migrants, which migrate quickly downstream after emerging, but rear in the estuary for several weeks to months, and 3) Parr migrants, which rear for a couple of months in freshwater before moving through the estuary.

The fourth life history strategy is the stream-type Chinook, or yearlings, which rear in freshwater for a period of over one year. Spring runs of Chinook tend to have a higher proportion of stream-type Chinook, roughly 50 percent. A study by Beamer et al. (2010) showed that the majority of juvenile Chinook rearing in freshwater portions of the Skagit River prefer pool, glide, and bank habitat. Smolt trap data in the mainstem of the lower Skagit River suggests that ocean-type populations dominate the juvenile out-migration (Seiler et al. 1995, Myers et al. 1998); however, stream-type Chinook are present as well.

Juvenile outmigration occurs from March through late July. Adult upstream migration occurs from February through July for spring and summer Chinook and July through November for fall Chinook (USACE 2021). All Skagit River populations of Chinook transit the action area during migration. All of the stocks could be present as upstream migrating adults during the specified window for in-stream construction (June 15 to August 31). Outmigrating juveniles could be present during the months of June and July. Stream type juveniles could be present during the entire work window, albeit in low numbers.

The lower Skagit mainstem/tributaries Chinook stock spawning takes place in the mainstem Skagit River and tributaries downstream from the Sauk River typically in October (SRSC and WDFW 2005). The spawning area identified by WDFW includes the river adjacent to the proposed repair site at DD 12 (WDFW 2018b). All other populations of Skagit River Chinook spawn further upstream in the Skagit River and its tributaries. The time of upstream migration of adults and spawning varies with stock. Upstream migrating adults are expected to be in the river along the sites during construction.

Skagit River steelhead include a winter and summer run. The project area is a migration corridor for upstream migrating adults and downstream movement of juveniles migrating to saltwater environments. Winter run steelhead enter the Skagit River as adults from November through April. Summer run steelhead return to freshwater from May to October (NMFS 2007). The spawning area of the mainstem population extends from roughly one mile upstream of the I-5 Bridge (RM 22.5) to the lower headwaters of the Skagit Basin (WDFW 2002). All other populations spawn in the headwaters of the river. Spawning typically occurs from March through June, but can be as early as January (NMFS 2007). The DD 12 repair site is adjacent to the spawning reach of the mainstem population. Post-spawn adults exit the river from April through June. Summer steelhead reside for extended periods in deep pools (PSSTRT 2013). The majority of Skagit River steelhead migrate to the ocean after 2 years, with some doing so after 1 or 3 years (NMFS 2005b). Outmigration typically occurs from April to mid-May (NMFS 2007), although in the Skagit River system is has been shown to occur extend from March to August. In 2009 the Skagit spring steelhead fishery was closed after experiencing a historically low run of less than 3000 fish Numbers rebounded a bit between 2012 and 2017, but then declined since their recent peak in 2014, with 3092 fish returning in 2020.

Given the close proximity to spawning areas and the fact that juveniles spend multiple years in freshwater before outmigrating, the juveniles may be present year-round. Multiple age classes of juveniles may be present in the vicinity including fry and yearlings. Working during the in-water work window avoids the spawning period for steelhead; however, adult migrant and juvenile steelhead may be present in the project area during the construction.

Critical Habitat within the Action Area

The Skagit River within the action area has been designated as critical habitat for PS Chinook salmon and PS steelhead. The critical habitat within action area provides the Freshwater Migration and Freshwater Rearing PBF for both species. It also provided the Freshwater Spawning PBFs for PS Chinook salmon.

<u>Distinguishing Effects the Action versus Baseline Conditions</u>

The effects of an action are the consequences to listed species or critical habitat that would not occur but for the proposed action and are reasonably certain to occur, whereas the environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area without the consequences caused by the proposed action (50 CFR 402.02). In their current, damaged states (baseline), the level of flood protection provided by the levees is for a one-year flood (100 percent annual chance). Repair of the levees will re-establish the pre-existing level of protection to a 50-year storm event (two percent annual chance) and contribute to the overall integrity of the levee system (these are effects of the proposed action). Because the levees operate as a system, the repairs to these two areas will increase the level of flood protection of the entire system, bringing it back to the pre-damaged state. The levee repairs also include armoring (revetment) that will prevent the river from migrating at the location of the repairs (effect of the action).

Distinguishing between effects of the action and baseline, we consider the existing, damaged levees to be the baseline, along with the altered river function associated with the levees, and the existing highly developed floodplain. Therefore, as a baseline condition, the rigid physical structures of the levees prevent natural channel edges from forming and isolate the river from its floodplain, with the repair sites currently vulnerable to erosion and failure. It is likely that thousands of Chinook salmon and steelhead are affected the leveed streambank conditions annually and in perpetuity. Bank stabilization reduces the quality of edge habitat and the density of juvenile salmonids that otherwise rear near stream margins. Beamer and Henderson (1998) reported a reduction in juvenile rearing density of five to 10 times between natural forested banks and riprapped banks. Beechie et al. (2006) reported that modified banks lacked backwater areas, and pools created by eddies. Fish species have much lower densities and diversity in riprap areas than in natural areas (Bolton and Shellberg 2001). More fish species and abundances are found in areas with natural banks due to the greater diversity of habitat in these areas (Beamer and Henderson 1998).

The effects of streambank alteration are not limited to the wetted stream channel and extend beyond the river's edge. Connectivity longitudinally (up- and down-stream), laterally (floodplain and uplands) and vertically (groundwater and hyporheic) are major ecological features of natural stream corridors (Stanford and Ward 1992). Levees affect the hydrology, biology, morphology and water quality of rivers (Bolton and Shellberg 2001). Typically, changes due to human activities in the channel migration zone result in a reduction in habitat diversity, which affects the numbers and kinds of animals that can be sustained. Because the lateral river movement is fixed between the levees, the opportunity for the river to experience habitat forming processes is muted, resulting in a modified river system that is limited its ability to support optimal growth, abundance, reproduction, and survival of listed species.

Habitat complexity is the key factor related to success of species during and after floods (Pearsons et al. 1992; Letcher and Terrick 1998; Bischoff and Wolter, 2001). These complex habitat features are formed and maintained by the same flood events, which may form new pools, floodplains, and gravel bars (Bischoff and Wolter 2001). Following floods in natural river systems, complex reaches lost proportionately fewer fish, had higher fish diversities, and had higher fish assemblage than simple reaches (Pearsons et al. 1992). Juvenile fish are particularly vulnerable to strong flows associated with floods because of their limited swimming ability and small size (Pearsons et al. 1992). Valuable habitat used by juveniles during floods includes inundated floodplain which serves as a nursery (Bischoff and Wolter 2001). The loss of floodplain directly reduces the complexity of watercourse reaches and permanently removes valuable rearing and holding areas during floods (Reeves et al. 1995). The loss of riparian and floodplain habitat results in an increase in fish washed downstream and a reduced ability to recolonize following the flood. Channeling and diking isolates floodplains, thereby reducing the amount of channel habitat available for juvenile salmonids. Hayman et al. (1996) demonstrated that natural and unaltered floodplains have twice the amount of channel habitat than isolated floodplains. Assuming a direct correlation to the amount of habitat available, unaltered floodplains may support up to twice the amount of salmonids as riprapped or altered floodplains. Indeed, floodplain habitats provide among the most productive juvenile salmon and steelhead rearing areas (Sommer et al. 2001; Sommer et al. 2004; Jeffres et al. 2008).

The Skagit River in the project location is disconnected from its floodplain by the levee system, which inhibits habitat forming processes. However, because the adjacent floodplain is highly developed with roads, cities, farms, and suburban/rural development, the current vulnerability of levees to failure, flooding, and erosion at the repair sites creates a dangerous, undesirable situation for listed fish. Fish could be carried into the floodplain and become stranded and die behind the levees, flood waters would create water quality problems if urban areas were to flood, and streambank erosion/migration, particularly at DD 3 would be undesirable because the levee is adjacent to a commercial business and road.

<u>DD 3</u>

A gravel and boulder point bar formed on the inside bank of the bend at this site. Levees within this district are typically maintained with a grassy surface that is mowed regularly along the crown and side slopes. Along the Skagit mainstem, most of the levee in this district is setback from the river; however, along the South Fork of the Skagit River and along Tom Moore Slough, the levee generally follows the river's edge with only a few riverward vegetated benches. Typically, this rural district does not maintain its revetments as extensively as other urban Skagit districts, such that vegetation along the revetment grows in wider tracts with larger trees. At the repair site, the levee crown, back slope, and riverward slope are maintained as grassy surfaces. Any vegetation is found in a narrow band along the revetment/levee face. The existing levee has a 2 to 1 vertical slope on either side of the repair site. In its current condition, the repair site is a concave bowl cut back into the levee with no vegetation. In this existing state, flooding behind the levee into developed areas (farms, roads, businesses, other human infrastructure) is more likely if the repair is not completed. If the levee were to fail at this damaged section during a future flood, listed salmonids could be carried into the floodplain and likely become stranded and die behind the levee system.

<u>DD 12</u>

Large trees have been deposited on the lower levee bench at the bend in past floods and large wood often collides with the levee in this reach. Levees within this district are maintained with a grassy surface that is mowed regularly along the crown and side slopes. Levees within this district typically follow the river's edge with narrow grassy benches (less than 75 feet wide). At the repair site, the levee crown, backslope, and riverward slope are maintained as grassy surfaces. Any shrubby vegetation is in a narrow band along the revetment/levee face. The levee system as a whole is designed to provide for a 50-year level of protection (2 percent annual flood chance). In its current (baseline) state with the existing flood damage and completed emergency repair, the level of protection is currently at a 1-year level of protection (100 percent annual flood chance). The existing levee has a 2 to 1 vertical slope with exposed riprap and it has been cleared of willow trees in the footprint of the completed emergency work. In this existing state, flooding behind the levee into developed areas (farms, roads, businesses, other human infrastructure) is more likely if the repair is not completed. If the levee were to fail at this damaged section during a future flood, listed salmonids could be carried into the floodplain and likely become stranded and die behind the levee system. In addition, flood waters would enter developed areas and create hazardous conditions for both humans and aquatic life.

The levee system both prevents the river from flooding (isolates it from its floodplain up to its designed flood) and the levee system prevents the river from migrating. Flooding and channel migration are both habitat forming processes that are muted in lower Skagit River, and because the floodplain is highly developed, flooding through the developed areas is not desirable for human or aquatic life and haphazard channel migration into developed urban areas would not create favorable conditions for fish.

About 2.5 miles downstream of Mount Vernon, the river splits around Fir Island into the North and South Forks. Both forks further divide into smaller sloughs before flowing into Puget Sound. The majority of this system is confined to narrow channels completely disconnected from the floodplain and devoid of the natural complexity characteristic of alluvial processes and morphology. Because of these alterations of the system the aquatic and terrestrial organisms inhabiting the area, whose life history is dependent upon complex riverine processes, have likely suffered significant negative impacts.

The Skagit River delta was once a complex mosaic of distributary and tidal channels that weaved through estuarine wetlands and mudflats, maintaining a sediment source to these areas and providing habitat for a variety of aquatic organisms. Diking of the river has both cut off and/or filled distributary and tidal channels in the Skagit Estuary, and changed the processes that lead to the formation of such habitat types, including erosion and accretion patterns and sediment transport. Cutting off distributary channels from the river has also affected the marshes, essentially starving them of sediment. This is particularly evident in the marsh fringe area between the North and South Forks (Hood 2007).

In the Skagit Bay there are eelgrass beds at intertidal and subtidal elevations between the north and south forks and north of the North Fork in Skagit Bay (McBride et. al 2006). In Skagit Bay eelgrass bed distribution is disturbed and patchy in front of the North and South Forks from the diking of the lower river, resulting from the starving of deltaic wetlands of sediment and displacing it into Skagit Bay (Grossman 2012).

Water Quality

The Skagit River is designated for aquatic life uses as core summer salmonid habitat (WAC 173-201A-602). The core summer habitat designation is characterized by the river's use from June 15 to September 15 as either salmonid spawning or emergence, adult holding, use as important summer rearing habitat by one or more salmonids, or as foraging habitat by adult and sub-adult native char. Other common characteristic aquatic life uses for waters in this category include spawning outside of the summer season, rearing, and migration by salmonids. Water quality standards (i.e., temperature, dissolved oxygen, and turbidity) are established based on this aquatic life use designation. In addition, the Skagit River is designated for primary contact recreational uses, all water supply uses, and all miscellaneous uses.

In general, the upper reaches of the Skagit meet state water quality standards. Most of the substandard water quality conditions occur in tributaries to the Skagit River and in the Samish Basin, while the Skagit River itself meets standards on most occasions (Skagit County 2008). However, the mainstem river near DD 3 is on Washington Department of Ecology's (WDOE) 303d list for pH, meaning that it is impaired. This same reach is also listed as a water of concern for bacteria (WDOE 2016).

2.5 Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b).

As described in Section 1.3, the USACE proposes to conduct levee repairs at two sites under authority from Public Law 84-99. As described in Section 2.2, PS Chinook salmon and PS steelhead inhabit the project area. The proposed timing of the work minimizes the typical overlap of migration and spawning seasons for adult PS Chinook salmon and steelhead. However, low numbers of juvenile stream-type Chinook salmon that remain in the system year-round are likely to be present. Additionally, juvenile PS steelhead, which rear in freshwater for typically 2 – 3 years before migrating to the ocean, are likely to be present. Therefore, the planned construction may cause direct effects on juvenile PS Chinook salmon and steelhead through exposure to direct entrainment, construction-related noise, and turbidity and other water quality impacts. Construction may also cause indirect effects on adults and juveniles through impacts on riparian vegetation.

2.5.1 Effects on Listed Species

Flood Fight Activities (February 2020 DD 12 Repair Action)

The emergency response during the February 2020 flood included riprap placement on the riverward side of the levee at DD 12 where active erosion was occurring and included removal of willows spaced on 5-foot centers. Since the construction work occurred during the peak of a flood, any impacts to PS Chinook and PS steelhead were likely minimized due to the flood conditions.

Puget Sound Chinook salmon likely did not to occur in the river immediately adjacent to the levee during the short duration of the emergency response. This is due to the fact that this was one of the highest energy and most turbulent locations in the river and it was actively eroding. These are conditions Chinook salmon would likely avoid. If Chinook salmon were present in the vicinity during the flood, they would more likely occur on the opposite bank which is the inside bend in the river which means it has lower velocity and less turbulent flows. If steelhead were present in the vicinity during the flood, they would also more likely occur on the opposite bank which is the inside bend in the river which means it has lower velocity and less turbulent flows. Steelhead exhibit multiple behavior changes during flooding including sitting lower in the water column where currents are slower, hiding behind rocks and debris jams, and migrating to smaller side channels or shallow water areas with less current (Bash et al 2001, Bustard and Narver 1975, Harvey et al 1999, Healy and Lonzarich 2000).

Direct Entrainment

Despite the fact that floodwater would likely have displaced most salmonids from the fast-moving water along the levee face at DD12, a very small number of individual fish may have been directly entrained or crushed by the emergency equipment and rock placement. At most, a very small number of individual fish, relative to their respective Skagit River system subpopulations, would likely have been directly harmed or killed.

Effects from Noise

The background noise during the flood may have been even higher than typical background levels due to the flood conditions. Construction noise using heavy equipment has been measured in the range of 73 to 101 db (WSDOT 2018). Fast moving rivers have been demonstrated to create noise in the 80-120 dB level (Amoser and Ladich 2005). The noise of the construction activities was therefore likely in the same range or even lower than the background noise in the river. The low rumbling sound of the construction equipment would not have caused direct harm to fish form the sound pressure waves (WSDOT 2018) and the disturbance along the bank of the river would have masked by the flood conditions, making the likelihood of direct effects to fish from noise extremely low.

Turbidity

Background turbidity would have been high already during the flooding. Although no turbidity monitoring was conducted, the work was unlikely to cause turbidity greater than the already high background conditions due to the fast moving and turbulent waters along the bank. Any mobilized sediment along the bank would have diluted very quickly (within minutes) and would have been undiscernible within a few hundred feet of emergency work area.

Removal of Riparian Vegetation

The emergency work necessitated removing established willow trees along the bank of the river. This loss of vegetation reduced the habitat complexity along the bank of the river for a few hundred feet. This causes indirect effects to fish through reduced habitat quality (cover, food sources, temperature). This area will be replanted after the permanent work is completed. The resulting effects to PS Chinook salmon and PS steelhead is a temporal reduction in habitat quality of 5 to 10 years as the new willow plantings establish and grow. The scale of this effect to the fish is spatially very small and likely would not translate to a measurable effect of the growth and survival of listed fish as they rear and migrate through in this stretch of river.

Summary of Effects of Emergency Work to Fish

Taken as a whole, the collective effects of emergency work from direct entrainment by construction equipment, rock placement, increased turbidity, increased noise, and removal of riparian vegetation, would likely have caused direct harm or death to a small number of individual fish. The number of fish harmed or killed would have been extremely small, relative to the populations, because of the limited spatial scale (a few hundred feet along the levee) and temporal scale of the emergency work (two days of construction), together with the location of the work along the fast moving outside bend in the river, and the natural behavior of fish to move to quieter/slower moving waters during flood. If very small fish were present at the time, the fast-moving waters would have carried the fish quickly past the work area, further reducing the likelihood of direct harm.

Proposed Levee Repairs

The applicant proposes to complete all in-water construction within a work window starting approximately June 15, 2021, and completing work by August 31, 2021. The proposed work window coincides with the least impactful timing on PS Chinook salmon and PS steelhead.

The end of the upstream migration of adult spring-run PS Chinook salmon through the action area occurs before anticipated in-water work begins. Although the fish window, June 15 through August 31, corresponds to the portion of the year when juvenile Chinook are in the lowest abundance in the river, outmigrants can still be present. Ocean-type PS Chinook salmon (fry) are likely to have fully migrated to the marine environment during the proposed work window. Very few of these fish, if any, migrate through the project area during the work window. Stream-type PS Chinook salmon, in contrast, are likely to be present in the project area and during the work window. Although the work window avoids most PS Chinook salmon (particularly vulnerable fry), low numbers of stream type juveniles that are rearing in the river could be present in small numbers, as well as small numbers of migrating adults. Migrating or holding adults would be expected to occur in very low numbers during the in-water work window and would likely pass by the construction activity without delay or consequence because the work areas are very small sections of the river and the river is very wide, making for free passage past the work areas.

Adult summer-run PS steelhead are known to hold in upstream reaches of the Skagit basin during the proposed work window, and are not likely to be present in the project area. Adult winter-run PS steelhead are unlikely to have entered the Skagit River prior to the end of in-water construction activities. Likewise, juvenile PS steelhead, which reside in the Skagit River throughout the year and throughout the watershed, are likely to be present in the project area and during the work windows. Although the presence of these fish in the project area is likely, they are likely to be present only in low densities and abundances. Other life history stages (e.g., eggs) are not present during the work window.

The proposed action will affect larger juvenile life stages (yearlings) through exposing fish to directly entrainment by equipment or being crush by rock placement. Fish may also be displaced from preferred habitat through physical disturbance (noise), subjecting fish to elevated levels of turbidity during construction, and by long term effects including delayed vegetation re-establishment along the river bank and other long-term habitat effects associated with levees. These effects are discussed below.

Short-term Impacts

<u>Direct Entrainment</u>

If listed fish do not vacate the construction area, the activities may directly harm or kill a small number of individual fish by entrainment by the excavator during excavation and/or by crushing during rock placement. Entrainment of migrating and rearing juvenile fish can occur when fish are trapped during the uptake of sediments and water by excavation machinery, which can cause injury or death. The probability of entrainment is largely dependent upon the likelihood of fish occurring within the work area, fish densities, work depth, location of work within the river, equipment operations, time of year, and the species' life stage. Low densities of ESA-listed salmonids are likely to be present in the work area during construction. Fish are likely to be transitory in the immediate area, nevertheless, construction equipment can entrain juvenile salmon and steelhead. Therefore, the proposed action is likely to injure or kill a very small number, relative to the populations, of rearing juvenile PS Chinook salmon and PS steelhead.

<u>Noise</u>

The proposed action will produce underwater sound from the removal and placement of rock along the shoreline. The construction activity's greatest sound levels would likely be generated by removal and placement of rock below the waterline. Work conducted above the waterline could create sound that propagates through the ground to the water, albeit at a lower level than the source (Reinhall and Dahl 2011, Hawkins and Johnstone 1978). Studies directly measuring underwater sound from underwater rock placement are lacking (Wyatt 2008 and Kongsberg Maritime Limited 2015). Underwater sound generated from rock placement along a riverbank has not been studied. One study did measure sound from rock placement from a vessel through a steel/HDPE pipe in an open-water marine environment. This study measured sound levels up to 120 dB which were attributed primarily to the vessel (Nedwell and Edwards 2004). Underwater removal of rock conducted under the proposed action has similarities with backhoe dredging with respect to the equipment and material involved. A backhoe dredge is significantly larger and more powerful than excavators that would be used to conduct work under the proposed action, so the sound created by a backhoe would be expected to be more intense than that which could occur from the proposed action. Sound from backhoe dredging was measured between 124 and 148 dB at 60 meters (Reine et al. 2012). The authors estimated a maximum intensity at 1 meter of 179 dB.

NMFS fish injury thresholds for both continuous and pulsed sound are 183 db (for cumulative sound) and 206 db (for peak sound) (NMFS et al. 2008). The limited data available suggests sound potentially created by the proposed action would not exceed these thresholds and therefore not cause fish injury. Popper et al. (2014) and Rheine et al. (2012) both indicate there is no direct evidence for fish mortality or mortal injury from continuous sound such as that resulting from the proposed action. The NMFS threshold for fish harassment is 150 dB (NMFS et al. 2008). More recent literature suggests that noise levels above 163.3 dB μPa peak to peak should be used for behavioral responses (Popper et al. 2019 and Hawkins et al. 2014). It is possible this harassment threshold could be exceeded by the proposed in-water excavation work based on Reine et al. (2012) discussed above. If this were to occur, it would result in fish moving away from the immediate project site. This behavior is likely to occur regardless simply due to the ground and water disturbance associated with removing and placing rock along the levee. It is possible a temporary migration barrier for juvenile salmonids could be formed during short periods when this work is occurring. Vibrational disturbance during construction will be minimized by working from the top of the bank and placing rock individually or in small bucket loads (no end-dumping into the river).

Therefore, the noise effects of the backhoe and placement of material will likely temporarily disturb juvenile fish and cause them to move away from the noise source. Fish would likely vacate the area upon detection of increased sound pressure levels caused by the onset of rock placement and disturbance, but are unlikely to be negatively impacted by the sound itself. However, a small number of displaced fish may adversely affected by increased predation if they move into deeper water as discussed further below.

Turbidity

Excavation and placement of rock may lead to elevated temporary and localized turbidity levels surrounding the construction. Salmonids exhibit physiological and behavioral responses to suspended sediments (Newcombe and MacDonald 1991). Physiological effects can include gill trauma (Servizi and Martens 1987; Noggle 1978; Redding et al. 1987), and effects on osmoregulation, blood chemistry (Redding et al. 1987), growth, and reproduction. Behavioral responses include feeding disruption from olfactory and visual impairment (Kim et al. 1986, cited in Sigler 1988); gill flaring; and curtailment of territorial defense (Berg and Northcote 1985). Conversely, some protection against predation may be afforded salmonids in areas of suspended sediment (Gregory and Levings 1996). Suspension of sediments can increase biochemical oxygen demand and reduce dissolved oxygen levels in the water. Turbidity levels will be minimized during construction by working during a period of low summer flows, avoiding in-water excavation to the extent practicable, placing rock individually or in small bucket loads (no end-dumping into the river), working from the top of the bank, and using clean rock with minimal fine sediment. Rock placement could cause injury or death if PS Chinook or PS steelhead are within the project location at the time of material placement or removal. Most listed salmonids in the mainstem during the in-water work window are larger and able to swim away from sources of disturbance or will not be present during the construction period. Even if no injury occurs, rock placement and removal could disturb and displace an individual temporarily in the project area causing harm through increased predation exposure or reduced feeding and stress.

Long-term impacts:

As described in Section 2.2, the baseline habitat conditions of the Skagit River are degraded by the existing levees. The proposed action will increase the level of flood protection provided by the damaged levee system from a 100 percent annual chance flood to a two percent annual chance flood. Because the levees operate as a system, the repairs to these two areas will increase the level of flood protection of the entire system, bringing it back to the pre-damaged state. The levee repairs also include armoring (revetment) that will prevent the river from migrating at the location of the two repairs. In this project area, the floodplain is a developed landscape with the Cities of Burlington and Mount Vernon, farmland, and other human development in the floodplain, protected from flooding by the levee system. Re-establishing the flood protection will prevent floodwaters from overtopping the levee at the repair sites up to the 50-year design flood, which will keep fish in the river and prevent them from being stranded in the floodplain, as well as keep floodwaters out of the urban areas, which is preferable for water quality. The repairs will also prevent the river from eroding at the damaged sites. The land immediately behind the DD 3 repair has a commercial business on it with parking lots, buildings, and roads. Keeping the river from eroding into this area is preferable. The area immediately behind DD 12 is a farm field with housing developments beyond that; this location is also not a location where haphazard channel migration would be preferable to the slope layback and willow plantings.

The project is not expected to impact the overall water quality of the river, but will largely continue the baseline conditions that impact forage, shade, and undercut bank creation at the project sites. Construction will remove existing willow trees along the levee and will replace lost armor rock. The conservation/mitigation features, including 700 LF of slope layback, native plantings, and topsoil placement and hydroseed, and placement of rootwads downstream of DD 3, would partially offset construction-related impacts and are designed to improve the existing edge habitat for rearing salmonids within the constraints of the existing levee system and proposed levee repairs.

There may be an incremental effect on water temperature from the removal of sparse vegetation along the repair sites for several years or more. However, the effect will be so minute as to not be measurable compared to the background temperature of the river within a few hundred feet of the work areas because of the limited linear distance of the repairs compared to the vastness of the river flow. Over time, willow plantings incorporated into the repair design will provide cover and benefit for salmonid prey resources. The plantings are expected to create a continuous vegetation band throughout the project area and, although there will be a temporal lag, vegetation will begin to shade the rock within a few growing seasons, improving the bankline over the existing condition. Given the limited linear feet of disturbance (150 LF at DD 3 and 700 LF at DD12) relative to the size and flow of the mainstem Skagit River, any minute change in temperature in the water along the riverbank is not likely to harm any listed fish.

Repairs to the levees will have a minor deviation in rock size. Rock class size tables have been updated from previous years and while DD 3 will have a decrease in size from class IV to class III the overall size in inches is the same. DD 12 will have an increase in size from class IV to class V. However, rock size has not been shown to have significant effects on fish species. In fact, in some cases larger rock size has been shown to have more bankline complexity with larger void spaces (Lister et al. 1995; Schmetterling et al. 2001; Zale and Rider 2003). This minor deviation in rock size is not expected to significantly change existing habitat conditions, but it does perpetuate degraded streambank conditions into the future by contributing to the maintenance of the levee system.

Peters et al. (1998) compared seasonal fish densities in Washington at sites with various bank stabilization structures. They surveyed typical bank stabilization methods and found that 496 of 667 projects used riprap or riprap with deflectors. Only 29 projects used bioengineering or large woody debris. Of all project types (riprap, riprap with large woody debris, rock deflectors, rock deflectors with large woody debris), only sites stabilized with large woody debris consistently had higher fish densities in spring, summer, and winter than the control sites without any stabilization structures (Peters et al. 1998). Riprap sites consistently had lower densities than control sites. At all sites, fish densities were generally positively correlated with increasing surface of large woody debris and increasing amounts of overhead riparian cover within 30 centimeters of the water surface. Replacement of bank armor to maintain the existing system of flood control will perpetuate a lowered ability of the project area to support rearing fish.

Given the constraints of the existing levee system, the application of the HCMT framework will result in incrementally improved habitat conditions over time compared to the existing conditions by creating a slope set back along 700 LF of levee at DD 12 and by replanting willows along the river bank and placing large woody debris at DD 3. The slope set back will create additional high-water refuge habitat. Planted native riparian vegetation, with time and maturity, is expected to provide shade to the channel and natural silt deposition will cover the riprap slopes. The plantings will also provide organic input through leaf drop to nurture the base of the food web and serve as a source of terrestrial insects for forage for juvenile fish. Placement of large woody debris downstream of DD 3 will provide additional refuge for listed salmonids and their prey species. While the HCMT was developed based on studies of Chinook habitat preferences, these efforts will also partially offset the levee impacts to edge habitat functionality for PS steelhead.

Summary of Effects on Listed Species

Collectively, a small number of listed fish, relative to their respective populations, may be directly harmed or killed during construction if they occur directly in the work area. Additionally, disturbance from construction will likely cause juvenile PS Chinook salmon and PS steelhead to be displaced from the construction area (toe of the levee) and immediately adjacent areas. These larger juvenile/yearling fish are mobile and capable of evading some construction disturbance, but these fish may be forced to move into other suitable habitats already occupied by other fish or to areas that are devoid of natural cover. Thus, we anticipate an increased risk of predation on the juveniles while they move and hold away from construction area. The forced movement may also cause juveniles to expend additional energy while swimming in the Skagit River current. Increased energetic costs, combined with physiological stress caused by response to the construction disturbance are likely to reduce growth, fitness, and survival in a very small number of juveniles, relative to their respective subpopulations. In the long term, the repairs will keep fish in the river up to the 50-year design storm and keep the river from migrating into developed area. The mitigation/conservation measures will minimize the effects that the levees have on edge habitat by providing riparian vegetation, increased flood refuge at DD 12 compared to baseline conditions, and in-water habitat features from the anchored large woody debris at DD 3. These measures help to incrementally reduce the severity of the baseline habitat features that are negatively influenced by the existing levee system.

2.5.2 Effects on Critical Habitat

The effects to habitat are discussed in detail above as they relate to direct and indirect effects to listed fish. This section provides brief descriptions on how the action affects specific PBF's of critical habitat.

The completed emergency work caused temporary adverse effects to critical habitat conditions in the immediate project areas during construction and perpetuated existing leveed riverbank conditions. In the long term, the proposed action will also continue the overall baseline condition of a leveed river with incremental habitat enhancement elements incorporated into the levee design.

Levees, by definition, disconnect rivers from their floodplains. In this case, the floodplain is a developed landscape with the Cities of Burlington and Mount Vernon, farmland, and other human development in the floodplain, protected from flooding by the levee system. This project maintains this condition and re-establishes the pre-damage level of flood protection. The project is not expected to impact the overall water quality, but will largely continue the baseline conditions that impact forage, shade, and undercut bank creation at the project sites. Construction will remove existing willow trees along the levee and will replace lost armor rock. The conservation/mitigation features including 700 LF of slope layback, native plantings, and topsoil placement and hydroseed, and placement of rootwads downstream of DD 3 would partially offset construction-related impacts and are designed to improve the existing edge habitat for rearing salmonids within the constraints of the existing levee system and proposed levee repairs.

This assessment considers the intensity of expected effects in terms of the change they would cause in affected Primary Biological Features (PBFs) from their baseline conditions, and the severity of each effect, considered in terms of the time required to recover from the effect. Ephemeral effects are those that are likely to last for hours or days, short-term effects would likely last for weeks, and long-term effects are likely to last for months, years or decades.

<u>Critical Habitat for Puget Sound Chinook Salmon and Puget Sound Steelhead:</u>

The proposed action is likely to adversely affect critical habitat PBFs of PS Chinook salmon and PS steelhead at the project site in the near term from construction related disturbance. Over time, the conservation/mitigation measures will offset these effects and improve some features over baseline conditions (slope setback for increase flood refuge) within the confines of the leveed river. The essential PBFs of critical habitat for both species are listed below. The expected effects on those PBFs from the future work, including full application of the conservation/mitigation measures and BMPs, would be limited to the impacts to freshwater PBFs of PS Chinook salmon and PS steelhead. Impacts on freshwater rearing and migration would apply similarly to both species. Spawning only applies to PS Chinook in this portion of the Skagit River.

1. <u>Freshwater spawning sites:</u>
    a. Water quantity – No changes expected.
    b. Water quality – Construction would briefly increase turbidity. Impacts on riparian vegetation are likely to slightly increase water temperatures for several years as the willow trees re-establish. Detectable effects on temperature are expected to be limited to the area within about 300 feet of the project site and last for five to ten years. Reestablishing the 50-year level of flood protection will keep flood waters from entering urban areas and picking up contaminants.
    c. Substrate – The proposed action would cause long-term minor adverse effects on substrate. The levee repairs would permanently prevent erosion of the bank at the repair sites. The repairs maintain existing sediment transport and deposition longitudinally in the river, which maintains the reach’s baseline ability to support Chinook spawning.

2. <u>Freshwater rearing sites</u>:
    a. Floodplain connectivity – The proposed action will perpetuate the levee system thereby perpetuating long term adverse effects on floodplain connectivity. The levees permanently prevent natural channel migration past them, which is likely to lock the physical conditions at the sites in simplified states with steep banks and reduced edge habitat features such as undercut banks and alcove habitats. The 700 linear foot slope setback incrementally improves habitat conditions for juvenile salmonids by creating better flood refuge conditions at the project site compared to existing conditions. Because the floodplain is highly developed, repairing the damaged section is preferable vs the existing one-year level of protection.
    b. Forage – The proposed action perpetuates reduced forage opportunity in the leveed river. The simplified aquatic habitats created by levees are typically less supportive of salmonid foraging than natural banks. As the planted willow trees mature they will provide a

source of terrestrial insects and leaf litter - essentially maintain the existing baseline conditions over time.

c. Natural cover – The planted willows will grow thickly along the high-water line of river, providing cover for juvenile salmonids during high water flows. The large woody debris placement at DD 3 will provide in water cover. These conservation/mitigation measures will incrementally improve natural cover conditions over baseline conditions at the damaged sections, within the constraints of the baseline leveed river conditions.
d. Water quantity – No changes expected.
e. Water quality – Same as above.

3. Freshwater migration corridors:
   d. Free of obstruction and excessive predation – the proposed levee repairs perpetuate the simplified, armored riverbank which can increase predation pressure on juvenile salmonids. The conservation/mitigation measures help to minimize the severity of the baseline leveed river system, but not eliminate it. The scale of the effect of the repairs is spatially limited. The slope setback along 700 linear feet will provide refuge to juvenile salmonids during floods which incrementally improves over existing baseline conditions at this location and the anchored woody debris at DD 3 will add cover.
   e. Water quantity – No changes expected.
   f. Water quality – Same as above.
   g. Natural Cover – Same as above.
4. Estuarine areas – Effects will not extend into the estuary.
5. Nearshore marine areas – Effects will not extend into the marine nearshore.
6. Offshore marine areas – Effects will not extend into offshore areas.

2.6 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

For this action, state or private activities in the vicinity of the project location are expected to cause cumulative effects in the action area. Additionally, future state and private activities in upstream areas are expected to cause habitat and water quality changes that will be expressed as cumulative effects in the action area. Our analysis considers: (1) how future activities in the Skagit Basin are likely to influence habitat conditions in the action area, and (2) cumulative effects caused by specific future activities in the vicinity of the project location.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4).

Federally controlled actions (U.S. Army Corps of Engineers' permit actions in the aquatic action area) dominate current and future impacts in the action area for work directly in waters and Federal actions would require section 7(a)(2) consultation under the ESA. NMFS is not aware of any specific future non-Federal activities within this leveed portion of the Skagit River. The diking districts are nonfederal entities responsible for maintaining and operating the Skagit levees and other flood control structures in the project area. These nonfederal entities will continue to maintain and operate the flood control structures. This would likely include bank repairs and vegetation maintenance within the action area. These actions are expected to maintain the status quo of the area.

In the Skagit Basin, agriculture, urbanization, water withdrawals, timber harvest, fishing, mining and other resource-based industries have caused many long-lasting environmental changes that harmed ESA-listed species and their critical habitats. Those include basin-wide loss or degradation of stream channel morphology, spawning substrates, instream roughness and cover, estuarine rearing habitats, wetlands, floodplains, riparian areas, water quality (e.g., temperature, sediment, dissolved oxygen, contaminants), fish passage, and habitat refugia. Those changes reduced the ability of populations of ESA-listed species to sustain themselves in the natural environment by altering or interfering with their behavior in ways that reduce their survival throughout their life cycle. The environmental changes also reduced the quality and function of critical habitat PBFs that are necessary for successful spawning, production of offspring, and migratory access necessary for adult fish to swim upstream to reach spawning areas and for juvenile fish to proceed downstream and reach the ocean. The collective effects of these activities tend to be expressed most strongly in lower river systems, such as the lower reaches of the Skagit River, where the impacts of numerous upstream land management actions aggregate to influence habitat processes and water quality.

While widespread degradation of aquatic habitat associated with intense natural resource extraction is no longer common, ongoing and future land management actions are likely to continue to have a depressive effect on aquatic habitat quality in the Skagit River basin. As a result, recovery of aquatic habitat is likely to be slow in most areas and cumulative effects at the basin-wide scale are likely to have a neutral to negative impact on population abundance trends and the quality of critical habitat PBFs.

Although state, tribal and local governments have developed plans and initiatives to benefit ESA-listed salmon and steelhead, NMFS cannot consider them reasonably certain to occur in its analysis of cumulative effects until more concrete steps are taken in their implementation. Government actions are subject to political, legislative and fiscal uncertainties. These complexities make analysis of cumulative effects difficult.

There are some impacts that we predict are reasonably certain to occur into the future, such as construction and other habitat altering activities. To the extent that recovery actions are implemented and regulatory mechanisms are applied to on-going actions, adverse cumulative effects may be minimized, but will not be completely avoided.

2.7 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminishes the value of designated or proposed critical habitat for the conservation of the species.

The current extinction risk for PS Chinook salmon is high, and the recovery goal for this ESU is to have very low extinction risk. The current extinction risk for PS steelhead is high with neither the summer- nor winter-run populations currently viable. The recovery goal for this DPS is to have very low extinction risk (Myers et al. 2015; NWFSC 2015, NMFS 2019). All adult PS Chinook salmon and PS steelhead from populations above the action area in the Skagit River basin must migrate through the action area to reach their respective spawning grounds and there is some PS Chinook spawning within the project area. All juvenile PS Chinook salmon and PS steelhead from these populations must migrate to the ocean through the project area. Therefore, individuals from multiple populations of these two species could potentially be affected by the proposed action. Over the past several years, NMFS has engaged in various section 7 consultations on Federal projects affecting these populations and their habitats, and those effects have been taken into account in this opinion as part of the environmental baseline.

The environmental baseline is such that individual ESA-listed salmonids in the action area are exposed to degraded water quality, lack of suitable riparian and aquatic habitat, and restricted movement due to residential, industrial, commercial and agricultural development in the floodplain and the constraints of the existing levee system, construction and maintenance of hydropower and river navigation infrastructure, and other changes in land use practices. These stressors, as well as those from climate change, already exist and are in addition to any adverse effects produced by the proposed action. Major factors limiting recovery of the ESA-listed salmonids considered in this opinion include degraded freshwater habitat; degraded water quality; degraded floodplain connectivity and function; reduced access to spawning and rearing habitats due to impaired passage at dams; altered streamflow; predation/competition; hatchery impacts; and disease. The proposed action will affect two of the factors limiting recovery for the ESA-listed salmonids considered in this opinion by causing a temporary reduction in water quality and long-term continued degradation of habitat quality in the project area, with some of the effects of the baseline leveed system being offset by the conservation/mitigation measures.

The effects of the proposed action on the factors limiting recovery for the ESA-listed salmonids considered in this opinion include a temporary reduction in water quality in the action area from the placement of riprap during construction. The reduction in water quality will be short-term during construction. Because these effects are relatively brief and/or small in scale, survival and recovery of ESA-listed salmonids will not be affected. This is primarily because the number of fish within the project area during construction activities will be extremely small when compared to the total abundance of individuals within the populations affected by this action. Likewise, the long-term impacts of the proposed action including perpetuating the leveed river with incremental improvements in edge habitat. The project is not likely to result in any population-levels effects within the Skagit River subpopulations and would have no measurable effect at the ESU and DPS level. The cumulative effects described above should have a neutral to slightly negative effect on ESA-listed populations within the Skagit Basin.

The numbers of juveniles that were likely killed during the emergency flood fight were very small in proportion to their respective populations. Likewise, the numbers of juvenile fish that are likely to be injured or killed from the future work are too small to cause a measurable effect on the long-term abundance or productivity of any affected population, or to appreciably reduce the likelihood of survival and recovery of any listed species. The proposed action will have no effect on population diversity or spatial structure. Therefore, the effects of the proposed action will not reduce the productivity or survival of the affected populations of PS Chinook salmon or PS steelhead, even when combined with a degraded environmental baseline and additional pressure from cumulative effects and climate change.

Critical habitat value for ESA-listed species in the lower reaches of the Skagit River is limited by poor water quality, altered hydrology, lack of floodplain connectivity and shallow-water habitat, and lack of complex habitat to provide forage and cover. In the vicinity of the action area habitat has been degraded due to past land use practices, including agriculture, natural resource extraction, operation of water diversion facilities, and residential, commercial, and industrial development. Despite these impacts, the critical habitat in the action area has a high conservation value for PS Chinook salmon and PS steelhead due to its critical role as a migration corridor and juvenile rearing habitat, as well as spawning habitat for PS Chinook.

The same effects of the proposed action that will have an effect on ESA-listed salmon and steelhead will also affect critical habitat PBFs for salmon and steelhead critical habitat. The reduction in habitat quality associated with the proposed action will be due to the temporary decrease in riparian cover along the riverbank and reduction in benthic forage caused by site preparation, excavation, and rock placement. These effects may be longer in duration than effects on water quality, lasting weeks (benthic forage) to years (riparian vegetation) until the planted willows mature. However, the effects of this action will be limited to a relatively small area, and will not lower the quality and function of the necessary habitat attributes in the action area over the long term.

The levee/revetment system suppresses all Skagit River subpopulations as a baseline condition by eliminating natural river movement and riparian conditions that create habitat over time. The levees/revetments prevent many natural habitat-forming process from occurring. The result is less functional rearing habitat for juvenile fish and reduced carrying capacity of the habitat. The proposed construction activities will further reduce edge habitat complexity in the near term by removing established willows and grasses in the construction areas. The newly planted willows will take five to ten years to re-establish. During this time period, successive cohorts of fish will experience this habitat alteration with small numbers of fish, relative to their respective subpopulations, experiencing reduced fitness and survival rates from increased competition (density dependence) for food and available habitat along the river’s edge. Over time, the habitat conservation/mitigation measures (willow plantings, the slope set back at DD 12, and in-water cover/pool habitat at DD 3 form the large woody debris placemen) will offset these losses of fish with spatially small and incremental increases in habitat function over time within the constraints of the larger levee system. The conservation measures will offset the effects of construction over time as the planted vegetation matures and as the revetment rock fills in with finer material on the slope setback. Within 5 to 10 years, the willows will create complex edge habitat along the bank that will provide a source of terrestrial insects and cover for listed fish. As the planted vegetation matures, future cohorts of listed fish will experience improved edge habitat through the work areas and increased flood refuge from the slope setback. The negative construction effects and the positive mitigation/conservation measures are likely too small to cause observable subpopulation level effects, but in the long term, the slope setback and willow plantings will incrementally improve edge habitat, within the constraints of the levee system and the overarching degraded baseline habitat.

At the watershed scale, the proposed action will not increase the extent of degraded habitat within the basin, add to the degradation of water quality, or further decrease limited rearing areas or limit access to rearing habitat over the long term. Even when cumulative effects and climate change are included, the proposed action will not negatively influence the function or conservation role of critical habitat at the watershed scale. Critical habitat for PS Chinook salmon and PS steelhead will remain functional, or retain the current ability for the PBFs to become functionally established, to serve the intended conservation role for the species, in this case, to provide freshwater rearing sites, migration corridors, and spawning

For all the reasons described in the preceding paragraphs of this section, the proposed action will not appreciably reduce the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction or distribution nor will the proposed action reduce the value of designated critical habitat for the conservation of the species.

2.8 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of Puget Sound Chinook salmon or Puget Sound steelhead or destroy or adversely modify their designated critical habitat.

2.9 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this incidental take statement.

2.9.1 Amount or Extent of Take

In this opinion, the effects of the completed emergency work are described. Because this work is already complete and ESA Section 7 take exemptions are prospective, no take exemption is given for the completed work. For the future work, NMFS determined that incidental take would occur as follows. The proposed action will directly harm small numbers of fish during construction and cause long term hard through habitat modification to some exposed fish. Therefore, the proposed action is reasonably certain to cause take of listed fish. The habitat modification causing take will do so by impairing normal rearing and holding behavior.

The NMFS' ability to quantify the amount of take in numbers of fish can be difficult if not impossible to accomplish in the case of take in the form of harm, because the range of individual fish responses to habitat change is variable. Some will encounter changed habitat and merely react by seeking out a different place in which to express their present life history. Others might change their behavior, causing them to expend more energy, suffer stress, or otherwise respond in ways that impair their present or subsequent life histories. Yet others may experience changed habitat in a way that kills them. In such circumstances, we cannot provide an amount of take that would be caused by the proposed action, and rely instead on indicators of the extent of take due to habitat alteration as surrogates for the amount of take.

The best available indicators for the extent of take are:

1. For harm associated with temporary construction disturbance and long-term habitat alteration, the take surrogate is the linear feet of levee repair which is 150 linear feet at DD 3 and 700 linear feet DD 12. This take indicator operates as an effective re-initiation trigger.

This feature is the best to integrate the likely take pathways associated with this action, is proportional to the anticipated amount of take, and is the most practical and feasible indicator to measure. Exceedance of thee limits would constitute an exceedance of authorized take that would trigger the need to reinitiate consultation.

2.9.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Having added the effects of the action to the baseline, and considering the status of the species and cumulative effects, NMFS concludes that the take from the proposed action is not likely to jeopardize the continued existence of Puget Sound Chinook salmon, or Puget Sound steelhead. Having added the effects of the action on PBFs to the baseline condition of the PBFs, and considering the status of critical habitat and its conservation values, the NMFS concludes that the proposed action will not destroy or adversely modify designated critical habitat.

2.9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02). The USACE and applicant shall minimize incidental take by:

1. Minimize incidental take from construction and long-term habitat alteration;

2. Monitor and adaptively manage riparian plantings for a period of three years to ensure 80 percent survival of the total number of plantings installed.

2.9.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the USACE or any applicant must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). The USACE or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. To implement RPM No. 1, the USACE shall submit as-built reports with pictures for the repairs within 60 days following completion of construction.

2. To implement RPM No. 2, the USACE shall submit a report to NMFS detailing the first year of monitoring by December 31, 2022 documenting survival of riparian plantings at or above 80 percent. If, after the first year less than 80 percent of plantings survive, replant, monitor, and report survival the second year to NMFS by December 31, 2023. Report survival by December 31, 2024 for the final result.

2.10 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

The following recommendation is a discretionary measure that NMFS believes is consistent with this obligation and therefore should be carried out by the USACE:

- Encourage discussion among Diking Districts, Skagit County, Cities of Burlington and Mount Vernon, USACE, NMFS, and interested Tribes to foster setting back existing levees in the Skagit basin.

- Develop/improve monitoring of mitigation/conservation measures to improve adaptive management by the USACE and confirm the presumed benefits of the measures.

Please notify NMFS if the USACE carries out this recommendation so that we will be kept informed of actions that minimize or avoid adverse effects and those that benefit listed species or their designated critical habitats.

2.11 Reinitiation of Consultation

This concludes formal consultation for the USACE. As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

2.12 Not Likely to Adversely Affect

<u>Southern Resident Killer Whale</u>

Southern Resident killer whales (SRKW) do not enter the Skagit River and so would not occur in the immediate project area. The action area extends into the Puget Sound through food web interactions via effects to PS Chinook salmon. No direct effects to Southern Resident killer whales were likely from the flood fighting activities because the direct effects of construction (noise and turbidity) occurred locally in the project area in the river, therefore SRKWs were not exposed to construction disturbance. Indirect effects from loss of prey of Chinook salmon would have been inconsequential to SRKWs because the number of individual Puget Sound Chinook salmon that may have been harmed by the emergency work was likely to have been extremely small and not measurable in terms of available prey for SRKWs.

In the long term, no direct effects to SRKW will result from the proposed construction activities because SRKWs do not enter the Skagit River. SRKW will experience very small reductions in available PS Chinook salmon from the Skagit River subpopulations as a result of the direct loss of small numbers of PS Chinook salmon during construction and over time from reduced habitat conditions before the newly planted willows mature. The scale of the reduced prey availability will be tiny relative to all available prey within the larger action area and not likely to cause starvation or adverse health effects to any one individual SRKW.

Southern Resident Killer Whale Critical Habitat

Designated critical habitat of SRKW does not extend into the river. Because the proposed action will have an extremely small effect on Skagit River Chinook population the effect of prey availability PBF of SRKW is insignificant. There will not be a measurable effect on available prey from the proposed action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the USACE and descriptions of EFH for This analysis is based, in part, on the EFH assessment provided by USACE and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

The proposed action and action area for this consultation are described in the Introduction to this document. The action area includes areas designated as EFH for various life history stages of Chinook and Coho (*O. kisutch*), and PS pink salmon (PFMC 2014).

3.2 Adverse Effects on Essential Fish Habitat

- Based on information provided by the action agency and the analysis of effects presented in the ESA portion of this document, NMFS concludes that proposed action will have adverse effects on EFH designated for Chinook, pink, and Coho salmon. These effects include a temporary reduction in water quality from increased turbidity, and temporary reduction in habitat value (specifically from reduced forage and cover) caused by temporal loss of willows in the work area, in-water excavation, and riprap placement. The project will also have long term adverse effects associated with continued presence of the leveed river, albeit with incrementally improved habitat features incorporated into the levee design.

3.3 Essential Fish Habitat Conservation Recommendations

Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described above, approximately 2.5 acres of designated EFH for Pacific coast salmon.

1. Encourage discussion among Diking Districts, Skagit County, Cities of Burlington and Mount Vernon, USACE, NMFS, and interested Tribes to foster setting back existing levees in the Skagit basin.

2. Develop/improve monitoring of mitigation/conservation measures to improve adaptive management by the USACE and confirm the presumed benefits of the measures.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the USACE must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The USACE must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these

DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are U.S. Army Corps of Engineers (USACE). Other interested users could include the Nooksack River diking districts, Whatcom County, Nooksack Watershed Lead Entity, Treaty Tribes and others interested in the conservation of the affected ESUs/DPS. Individual copies of this opinion were provided to the USACE. The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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